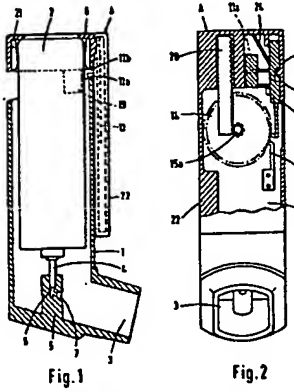


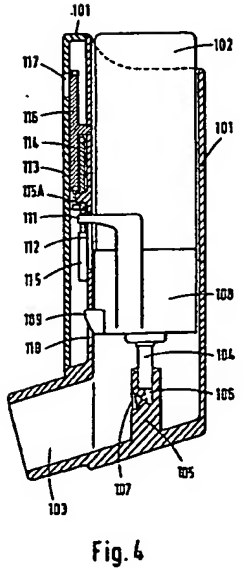
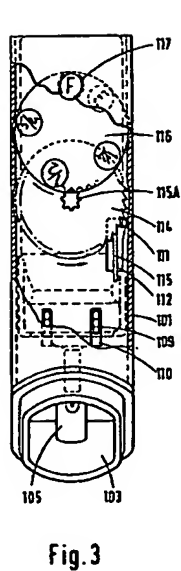
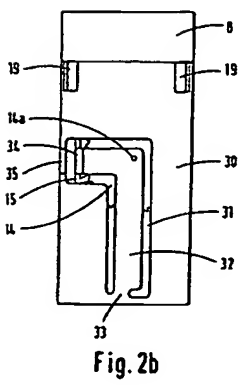
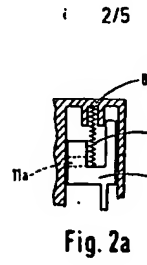
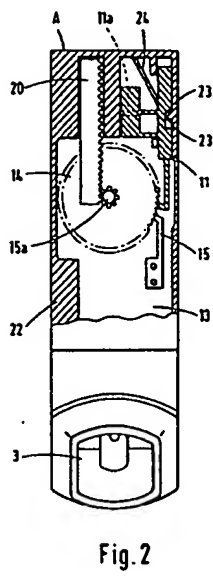
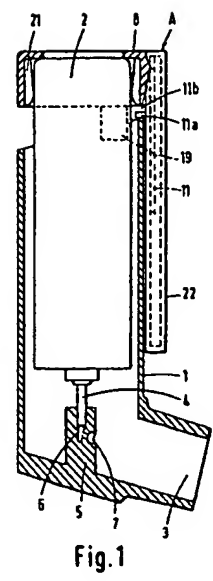
(1) Application No. 8708743
(2) Date of filing 24 Apr 1987
(3) Priority date
(4) Priority date
(5) Priority date
(6) Priority date
(7) Priority date
(8) Priority date
(9) Priority date
(10) Priority date
(11) Priority date
(12) Priority date
(13) Priority date
(14) Priority date
(15) Priority date
(16) Priority date
(17) Priority date
(18) Priority date
(19) Priority date
(20) Priority date
(21) Priority date
(22) Priority date
(23) Priority date
(24) Priority date
(25) Priority date
(26) Priority date
(27) Priority date
(28) Priority date
(29) Priority date
(30) Priority date
(31) Priority date
(32) Priority date
(33) Priority date
(34) Priority date
(35) Priority date
(36) Priority date
(37) Priority date
(38) Priority date
(39) Priority date
(40) Priority date
(41) Priority date
(42) Priority date
(43) Priority date
(44) Priority date
(45) Priority date
(46) Priority date
(47) Priority date
(48) Priority date
(49) Priority date
(50) Priority date
(51) Priority date
(52) Priority date
(53) Priority date
(54) Priority date
(55) Priority date
(56) Priority date
(57) Priority date
(58) Priority date
(59) Priority date
(60) Priority date
(61) Priority date
(62) Priority date
(63) Priority date
(64) Priority date
(65) Priority date
(66) Priority date
(67) Priority date
(68) Priority date
(69) Priority date
(70) Priority date
(71) Priority date
(72) Priority date
(73) Priority date
(74) Priority date
(75) Priority date
(76) Priority date
(77) Priority date
(78) Priority date
(79) Priority date
(80) Priority date
(81) Priority date
(82) Priority date
(83) Priority date
(84) Priority date
(85) Priority date
(86) Priority date
(87) Priority date
(88) Priority date
(89) Priority date
(90) Priority date
(91) Priority date
(92) Priority date
(93) Priority date
(94) Priority date
(95) Priority date
(96) Priority date
(97) Priority date
(98) Priority date
(99) Priority date
(100) Priority date

(1) Indicating device
(2) A device indicates the number of doses dispensed from an aerosol container 2, (102) having an outlet valve member 4, (104) movable relative to the body of the container to dispense its contents in measured doses. Relative movement between the aerosol container body and the outlet member are detected by a ratchet wheel 14, (114) and ratchet driving member 11a, (111) which move with the body and outlet member respectively or vice versa. The ratchet wheel may in turn drive an indicating member in the form of a linear rack 20, (119, 120) or rotatable wheel (116). The linear rack may be driven by a spur wheel 15a (115a) or a single start worm (118, Figs. 5 & 6) which engages a row of projections on the linear rack. Indication may be by numbers or colours and an indication may be given when the device is empty.



GB2 191 032 A

The drawing(s) are hereby incorporated by reference into the patent document as if they were reproduced in full in the patent document.



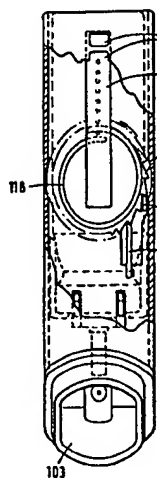


Fig. 5

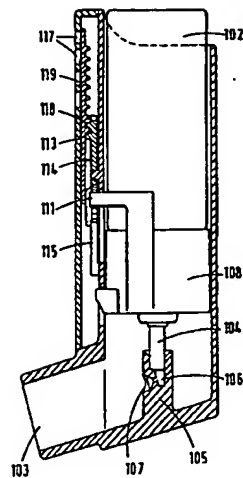
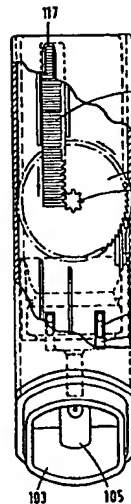


Fig. 6



down or remaining in the aerosol container. In a convenient arrangement, the markings on the indicator rack indicate that the aerosol container is empty after a predetermined number of doses for example 200 have been dispensed, this predetermined number being less than the number of doses with which the container has been charged, say 220, so as to allow for a margin of error.

With displacement of the cap member 8 and housing 22 towards the support 5, a resilient member 24 extends obliquely between the driving arm 11 and the top wall of the housing 22 in place under compression and distortion. Once the pressure applied to the cap member 8 has been released, the device A returns to the position illustrated in Figures 1 and 2. The force exerted by the resilient member 24 pushes the driving arm 11 downwards within the housing 22 so as to engage a subsequent tooth of the ratchet wheel 14. The device illustrated in Figures 1 and 2 may be modified by replacing the indicator rack 20 by a toothed indicator wheel which is engaged by the spur wheel 15A. Thus, on rotation of the ratchet wheel 14 the spur wheel 15A drives this indicator wheel.

In a further modification, the device illustrated in Figures 1 and 2, the spur wheel 15A is replaced on the ratchet wheel 14 by a single start worm and the toothed indicator rack 20 is replaced by an indicator rack having a row of projections engageable by this single start worm. Thus, in this case, rotation of the ratchet wheel 14 rotates the single start worm which in turn drives the indicator rack.

Figure 2a shows a modification of part of what is shown in Figure 2, the resilient member 24 being replaced by a compression spring 24'.

Figure 2b shows a device according to the invention viewed from the opposite side to Figure 2. The view shows a plate 30 which forms a cover for the mechanism visible in Figure 2b. A pin 31 is formed in the plate 30 to define a tongue 32, having the shape of an inverted L, connected to the remainder of the cover only by a narrow bridge 33. An upstanding leg 34 is formed on the lower edge of the L and a similar leg 35 is formed on the remainder of the cover on the opposite side of the slot to the leg 34. The material, e.g. plastic material, of which the plate is formed is sufficiently resilient that a user can urge the legs towards one another, for example by gripping them between a thumb and finger in which process flexing about the bridge 33 occurs. The plate 14a on which the wheel 14 rotates is mounted on the tongue 32, so that urging the legs 34 and 35 together moves the wheel out of engagement with the rack 20. This enables the rack 20 to slide down to the position in which it represents a value of zero doses having been dispensed. In this

way the counter is reset to zero. Thus, when one container has been dispensed the counter can be removed, reset to zero, and mounted on a full container, and in this way can be reused many times. The housing 101 is open at one end and which will hereinafter be considered the top of the device for convenience of description. The housing 101 is closed at the other end. An outlet 103 leads laterally from near the closed end of the housing 101. In the illustrated embodiment, the outlet 103 is in the form of a modifiable band for insertion into the mouth of a patient, but it may, if desired, be designed as a nozzle for insertion into the nostril of a patient.

The second container 102 has an outlet valve member 104 at one end. This valve member can be depressed to release a dose from the aerosol container or, alternatively, the valve member 104 can be fixed and the main body of the container may be moved relatively to the valve member 104 to release a dose. The aerosol container 102 is located in the housing 101 so that one end protrudes from the open top of the housing as shown clearly in Figure 4. Spacer ribs not shown may be provided inside the housing to hold the external surface of the container spaced from the internal surface of the housing. A support or stem block 105 is provided at the lower end of the housing 101 and has a passage 106 in which the valve member 104 of the aerosol container 102 can be located and supported. A second passage 107 is provided in the support 105 and is directed towards the interior of the outlet 103. Thus when the valve member 104 is depressed, a dose of medicament contained in the aerosol will be discharged through the passage 107 into the outlet 103 from which it can be inhaled by the patient. One dose will be released from the aerosol container each time it is fully depressed.

An actuator and container retainer member in the form of a ring 108 is guided for sliding movement in the housing 101. Locating lugs 109 protrude from the ring 108 and slide in slots 110 in the wall of the housing. The aerosol container 102 is fitted in the ring 108 in such a way that once it is fitted therein it cannot be removed therefrom and also so that the ring will move with the container 102 when it is depressed to open the outlet valve of the aerosol container. The fact that the aerosol container cannot be removed once it has been fitted prevents withdrawal abuse of the product by replacement with an alternative product which may be detrimental or even dangerous to the wellbeing of a patient and contrary to medical instructions.

A driving arm 111 extends from the ring

108 through a slot 112 in the wall of the housing 101 into an indicator compartment 113. The driving arm 111 engages a ratchet wheel 114 in the indicator compartment. The

ratchet wheel co-operates with a ratchet pawl 115. When the aerosol container 102 is depressed, the driving arm 111 causes downward and forward to the centre of the ratchet wheel 114, so engaging the next adjacent ratchet tooth. When the aerosol container 102 is released, the driving arm 111 moves upwards causing the ratchet wheel 114 to rotate the distance of one tooth, flangeable with the ratchet wheel 114 is a spur gear 115A which engages a toothed indicator wheel 116. Thus, the indicator wheel 116 rotates one step for each dose dispensed by depression of the body of the aerosol container 102. The front of the indicator housing 112 has a window 117 through which a portion of the indicator wheel 116 is indicated. This indicator wheel can be given suitable markings which are displayed through the window when the given markings registers with the window. Thus, in the embodiment illustrated the indicator wheel has markings "1/4", "1/2", "3/4", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13", "14", "15", "16", "17", "18", "19", "20", "21", "22", "23", "24", "25", "26", "27", "28", "29", "30", "31", "32", "33", "34", "35", "36", "37", "38", "39", "40", "41", "42", "43", "44", "45", "46", "47", "48", "49", "50", "51", "52", "53", "54", "55", "56", "57", "58", "59", "60", "61", "62", "63", "64", "65", "66", "67", "68", "69", "70", "71", "72", "73", "74", "75", "76", "77", "78", "79", "80", "81", "82", "83", "84", "85", "86", "87", "88", "89", "90", "91", "92", "93", "94", "95", "96", "97", "98", "99", "100", "101", "102", "103", "104", "105", "106", "107", "108", "109", "110", "111", "112", "113", "114", "115", "116", "117", "118", "119", "120", "121", "122", "123", "124", "125", "126", "127", "128", "129", "130", "131", "132", "133", "134", "135", "136", "137", "138", "139", "140", "141", "142", "143", "144", "145", "146", "147", "148", "149", "150", "151", "152", "153", "154", "155", "156", "157", "158", "159", "160", "161", "162", "163", "164", "165", "166", "167", "168", "169", "170", "171", "172", "173", "174", "175", "176", "177", "178", "179", "180", "181", "182", "183", "184", "185", "186", "187", "188", "189", "190", "191", "192", "193", "194", "195", "196", "197", "198", "199", "200", "201", "202", "203", "204", "205", "206", "207", "208", "209", "210", "211", "212", "213", "214", "215", "216", "217", "218", "219", "220", "221", "222", "223", "224", "225", "226", "227", "228", "229", "230", "231", "232", "233", "234", "235", "236", "237", "238", "239", "240", "241", "242", "243", "244", "245", "246", "247", "248", "249", "250", "251", "252", "253", "254", "255", "256", "257", "258", "259", "260", "261", "262", "263", "264", "265", "266", "267", "268", "269", "270", "271", "272", "273", "274", "275", "276", "277", "278", "279", "280", "281", "282", "283", "284", "285", "286", "287", "288", "289", "290", "291", "292", "293", "294", "295", "296", "297", "298", "299", "300", "301", "302", "303", "304", "305", "306", "307", "308", "309", "310", "311", "312", "313", "314", "315", "316", "317", "318", "319", "320", "321", "322", "323", "324", "325", "326", "327", "328", "329", "330", "331", "332", "333", "334", "335", "336", "337", "338", "339", "340", "341", "342", "343", "344", "345", "346", "347", "348", "349", "350", "351", "352", "353", "354", "355", "356", "357", "358", "359", "360", "361", "362", "363", "364", "365", "366", "367", "368", "369", "370", "371", "372", "373", "374", "375", "376", "377", "378", "379", "380", "381", "382", "383", "384", "385", "386", "387", "388", "389", "390", "391", "392", "393", "394", "395", "396", "397", "398", "399", "400", "401", "402", "403", "404", "405", "406", "407", "408", "409", "410", "411", "412", "413", "414", "415", "416", "417", "418", "419", "420", "421", "422", "423", "424", "425", "426", "427", "428", "429", "430", "431", "432", "433", "434", "435", "436", "437", "438", "439", "440", "441", "442", "443", "444", "445", "446", "447", "448", "449", "450", "451", "452", "453", "454", "455", "456", "457", "458", "459", "460", "461", "462", "463", "464", "465", "466", "467", "468", "469", "470", "471", "472", "473", "474", "475", "476", "477", "478", "479", "480", "481", "482", "483", "484", "485", "486", "487", "488", "489", "490", "491", "492", "493", "494", "495", "496", "497", "498", "499", "500", "501", "502", "503", "504", "505", "506", "507", "508", "509", "510", "511", "512", "513", "514", "515", "516", "517", "518", "519", "520", "521", "522", "523", "524", "525", "526", "527", "528", "529", "530", "531", "532", "533", "534", "535", "536", "537", "538", "539", "540", "541", "542", "543", "544", "545", "546", "547", "548", "549", "550", "551", "552", "553", "554", "555", "556", "557", "558", "559", "560", "561", "562", "563", "564", "565", "566", "567", "568", "569", "570", "571", "572", "573", "574", "575", "576", "577", "578", "579", "580", "581", "582", "583", "584", "585", "586", "587", "588", "589", "590", "591", "592", "593", "594", "595", "596", "597", "598", "599", "600", "601", "602", "603", "604", "605", "606", "607", "608", "609", "610", "611", "612", "613", "614", "615", "616", "617", "618", "619", "620", "621", "622", "623", "624", "625", "626", "627", "628", "629", "630", "631", "632", "633", "634", "635", "636", "637", "638", "639", "640", "641", "642", "643", "644", "645", "646", "647", "648", "649", "650", "651", "652", "653", "654", "655", "656", "657", "658", "659", "660", "661", "662", "663", "664", "665", "666", "667", "668", "669", "670", "671", "672", "673", "674", "675", "676", "677", "678", "679", "680", "681", "682", "683", "684", "685", "686", "687", "688", "689", "690", "691", "692", "693", "694", "695", "696", "697", "698", "699", "700", "701", "702", "703", "704", "705", "706", "707", "708", "709", "710", "711", "712", "713", "714", "715", "716", "717", "718", "719", "720", "721", "722", "723", "724", "725", "726", "727", "728", "729", "730", "731", "732", "733", "734", "735", "736", "737", "738", "739", "740", "741", "742", "743", "744", "745", "746", "747", "748", "749", "750", "751", "752", "753", "754", "755", "756", "757", "758", "759", "760", "761", "762", "763", "764", "765", "766", "767", "768", "769", "770", "771", "772", "773", "774", "775", "776", "777", "778", "779", "780", "781", "782", "783", "784", "785", "786", "787", "788", "789", "790", "791", "792", "793", "794", "795", "796", "797", "798", "799", "800", "801", "802", "803", "804", "805", "806", "807", "808", "809", "810", "811", "812", "813", "814", "815", "816", "817", "818", "819", "820", "821", "822", "823", "824", "825", "826", "827", "828", "829", "830", "831", "832", "833", "834", "835", "836", "837", "838", "839", "840", "841", "842", "843", "844", "845", "846", "847", "848", "849", "850", "851", "852", "853", "854", "855", "856", "857", "858", "859", "860", "861", "862", "863", "864", "865", "866", "867", "868", "869", "870", "871", "872", "873", "874", "875", "876", "877", "878", "879", "880", "881", "882", "883", "884", "885", "886", "887", "888", "889", "890", "891", "892", "893", "894", "895", "896", "897", "898", "899", "900", "901", "902", "903", "904", "905", "906", "907", "908", "909", "910", "911", "912", "913", "914", "915", "916", "917", "918", "919", "920", "921", "922", "923", "924", "925", "926", "927", "928", "929", "930", "931", "932", "933", "934", "935", "936", "937", "938", "939", "940", "941", "942", "943", "944", "945", "946", "947", "948", "949", "950", "951", "952", "953", "954", "955", "956", "957", "958", "959", "960", "961", "962", "963", "964", "965", "966", "967", "968", "969", "970", "971", "972", "973", "974", "975", "976", "977", "978", "979", "980", "981", "982", "983", "984", "985", "986", "987", "988", "989", "990", "991", "992", "993", "994", "995", "996", "997", "998", "999", "1000".

The device illustrated in Figures 5 and 6 is modified so that the ratchet wheel 114 will drive a single start worm 118 which in turn drives an indicator rack 119 having a row of projections engageable by the worm. The other parts of the device designated by the same reference are used with reference to Figures 3 and 4.

In the modified device illustrated in Figures 7 and 8, the ratchet wheel 114 again rotates a spur wheel 115A which engages and drives an indicator rack 120. Other parts of the device have the same reference numerals that are used in the description with reference to Figures 3 and 4.

The invention has hereinbefore been described in relation to medical inhalation devices but it is apparent that the invention may be applied to any container having a depressible dispensing valve to determine the quantity

of product used or that which is left in the container.

CLAIMS

1. A device for indicating the number of doses dispensed from an aerosol container having a body and an outlet member movable relative to the body to dispense its contents in measured doses, said device comprising movement detection means responsive to relative movement between the body and the outlet member and indicating means responsive to the movement detection means so that the indicator means is indicative of the number of movements of the body relative to the outlet member and, therefore, of the quantity of the contents of the container remaining therein or which have been discharged therefrom.
2. A device according to Claim 1, wherein the movement detection means comprises a ratchet wheel movable with one of the aerosol container and outlet member, and a ratchet wheel driving member movable with the other of the aerosol container and outlet member and arranged to rotate the ratchet wheel through a predetermined step upon relative movement of the aerosol container and outlet member.
3. A device according to Claim 1 or 2, wherein the indicator means is arranged to move linearly.
4. A device according to Claim 3 wherein the indicator means comprises a toothed rack and the ratchet wheel carries a spur gear which meshes with the toothed rack and drives it.
5. A device according to Claim 3, wherein the indicator means comprises an indicator rack having a row of projections, and the ratchet wheel carries a worm which engages the row of projections and drives the rack.
6. A device according to Claim 2, wherein the indicating means comprises a rotatable toothed indicating wheel, and the ratchet wheel carries a spur gear which meshes with the indicating wheel and drives it.
7. A device according to Claim 2, wherein the ratchet wheel itself constitutes the indicating means.
8. A device according to any preceding claim, comprising an actuator member adapted to be removably mounted on the body of the aerosol container so as to be displaceable with respect to the outlet member, the actuator member comprising a further member which, during at least a portion of the movement of the actuator member, is held stationary with respect to the outlet member.
9. A device according to Claim 8, wherein the said further member is arranged to be held stationary with respect to the outlet member by abutment with a housing in which the aerosol container is received and in which the outlet member is supported during relative movement of the container body.

10. A device according to Claim 8 or 9, wherein the actuator member comprises a ring-shaped cap adapted to be mounted on an end of the body of the aerosol container.

11. A device according to any one of claims 8 to 10, comprising means for resetting the indicator means to zero.

12. A device according to any preceding claim, wherein the indicating means carries no numbers, letters, or like characters.

13. An aerosol dispensing device comprising a housing in which an aerosol container can be located, an outlet leading from the housing and a support in the housing arranged to receive an outlet member of the aerosol container and having a passage through which the contents of the aerosol container may pass to the outlet, the outlet member being movable relative to the body of the container to dispense its contents in measured doses; and a dose indicating device according to any one of Claims 1 to 7.

14. An aerosol dispensing device according to Claim 13, wherein the dose indicating device comprises an indicator compartment disposed on a wall of the container-receiving housing, the dose indicating device comprising an actuator member mounted on and carried by the body of the aerosol container so as to be displaceable with respect to the outlet member, and hence with respect to the container-receiving housing, the said actuator member carrying an arm which extends into the said indicator compartment to operate the said indicating means.

15. An aerosol dispensing device according to Claim 14, wherein the said actuator member is arranged to be so mounted on the body of the aerosol container that it cannot be removed therefrom.

16. A dose indicating device substantially as herein described with reference to any of the embodiments shown in the accompanying drawings.

17. An aerosol dispensing device provided with a dose indicating device substantially as herein described with reference to any of the embodiments shown in the accompanying drawings.